

GMI workshop, March 18, 2008

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Current status of GMI aerosol model

1. Georgia aerosol-cloud models presented by Donlifer have been implemented into GMI (passed an initial test, haven't used in scientific studies yet).
2. Xiaohong's aerosol microphysical modal model has been implemented in GMI.
3. A radiative transfer code (CLDRAD) has been implemented.
4. A coupling gas-aerosol chemistry model is being developed. Debra and Huisheng ask for it for aerosol studies (Luis finished a coupling model in IMPACT model recently and he is willing to provide us help if needed).

The works have been done since last GMI meeting

1. *GMI GSFC group (Jules, Gary, Mian, Huisheng)* : HTAP, AeroCom-HTAP, CLDRAD. GMI aerosol data have been used in HTAP 2007 interim report. One paper in press: A satellite-based Assessment of Trans-Pacific Transport of Pollution (Yu et al., 2008, JGR). One submitted paper: Sensitivity of aerosol optical thickness and aerosol direct radiative effect to relative humidity (Bian et al., submitted to ACP). One in preparation: (Investigation of sea salt mass and aerosol optical thickness with two aerosol modules in GMI, Bian et al., in preparation).
2. *Debra* : Compared three versions of the sectional model and three versions of the modal aerosol model in a global 2D model (Weisenstein et al., 2007, ACP).

3. *Xiaohong* : Performed aerosol microphysics studies between present and past conditions and aerosol direct radiative forcing with three met fields (Liu et al., 2007, JGR).
4. *Penner's group (Joyce, Luis, ...)* : Finished development a SOA module and a paper has been submitted.
5. *Nenes's group (Thanos, Donlifan, Rafaella, ...)* : Implement CLDRAD into aerosol-cloud module. Repeated the whole assessment for different met fields. Implemented liquid droplet number parameterization with entrainment; initial run performed.

Proposals:

Debra:

Hindcast SO₂ emission for past 20-30 years, leading to changes in SO₂ and sulfate nucleation in the tropical tropopause area. This impacts sulfur in stratosphere, but may also impact stratospheric H₂O by modify ice particle size and number density in the TTL. Thanos and Xiohong are both interesting in ice particle. Mian Chin is also interested in the hindcast using SO₂ emissions to look at tropospheric aerosol. We need interactive chemistry-aerosols in GMI, and ice particle parameterization, which are already incorporated but not tested. She's also thinking to proposal a study for improving sulfur simulation due to PSC.

Huisheng (Mian, Nenes, Penner ?):

Investigation of nitrate aerosol and its influence on atmospheric chemistry and ecosystem. Add nitrate aerosol into our aerosol picture. Investigate the influence of nitrate aerosol on atmospheric chemistry through its altering photolysis field and heterogeneous chemistry. For example, HNO₃(g) partitions between gas-aerosol phases. Explore nitrogen deposition into terrestrial and oceanic ecosystems.

Nenes/X. Liu :

Aerosol-ice cloud interactions. Include ice nucleation scheme, ice sedimentation, aerosol impact on ice number given the IWC from met fields, radiative forcing.

Penner and Olcese :

Implement an SOA formation module (but we need first to do the chemistry – aerosol coupling).

Collaboration:

Wet deposition of aerosols: aerosol may also need to join in the convection/scavenging since aerosol has a different behavior than trace gases in wet scavenging, include both in-cloud and below-cloud scavenging of aerosols (Liu and Bian)

Any collaboration with Pete Colarco for aerosol microphysics (Liu).